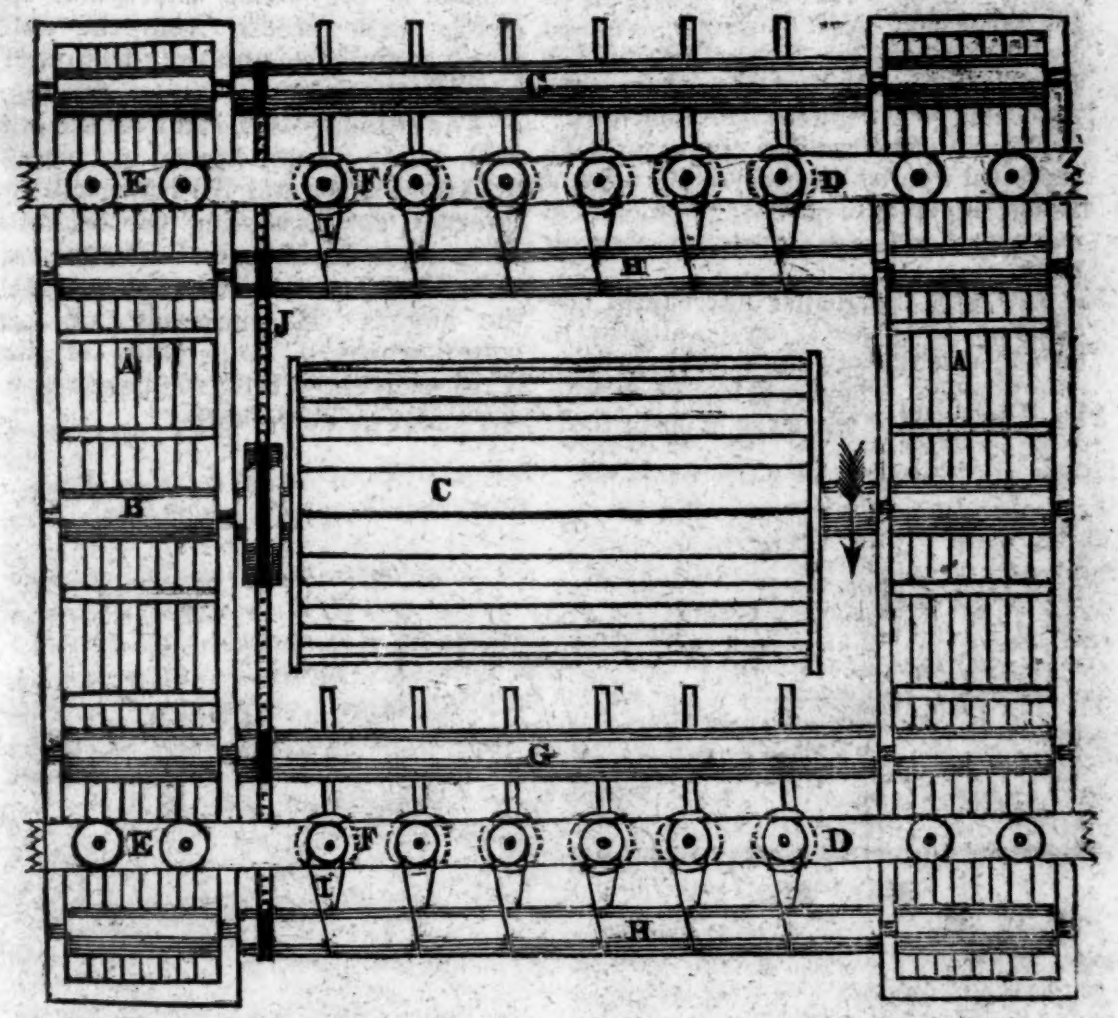
AMERICAN
MECHANICS' MAGAZINE,
Museum, Register, Journal and Gazette.

Come, bright Improvement! on the car of Time,
And rule the spacious world from clime to clime;
Thy handmaid Arts shall every wild explore,
Trace every wave, and culture every shore.——*Campbell.*

VOL. I.—No. 15.] SATURDAY, MAY 14, 1825. [Price $4 PER ANN.

Plan and Description of a Machine designed for Boring Rocks in beds of Rivers, preparatory to deepening and rendering their channels navigable—by E. CLARK.



The expense which the boring of rocks in the beds of rivers in the ordinary way involves; the exposure of the health of the workmen employed in this service; and the delays and disappointments, in respect to contemplated results, which follow such exposure at particular seasons of the year, almost as a necessary consequence, render some modification of the process highly desirable The difficulty of applying any machinery to this purpose, owing to the unevenness of the beds of rivers, obtrudes itself on our attention; but nevertheless, many situations occur in which the rocks are tabular or not much rounded and projecting, where it may be applied with facility, and to evident advantage. Where such are presented, that require to be removed, the application of the following de-

scribed apparatus will, it is believed, be found efficient.

Where the current is not sufficiently strong to propel the water-wheel and put the machinery in motion, the power of horses is to be resorted to, which can without difficulty be adapted to accomplish the same object.

Description.

AA, in the preceding figure, represent two boats or buoyant vessels, supposed for the convenience of description, to be anchored in a current.

B, the water-wheel shaft.

C, Water-wheel.

DD, two pieces of timber passing across the boats and space relatively occupied by the water-wheel. At a short distance below these are two other similar pieces, connected to the former by frame-work.

EE, with the similar circles in DD, represent a series of pullies, in the axles of which augers are placed, calculated to move upwards and downwards through them.

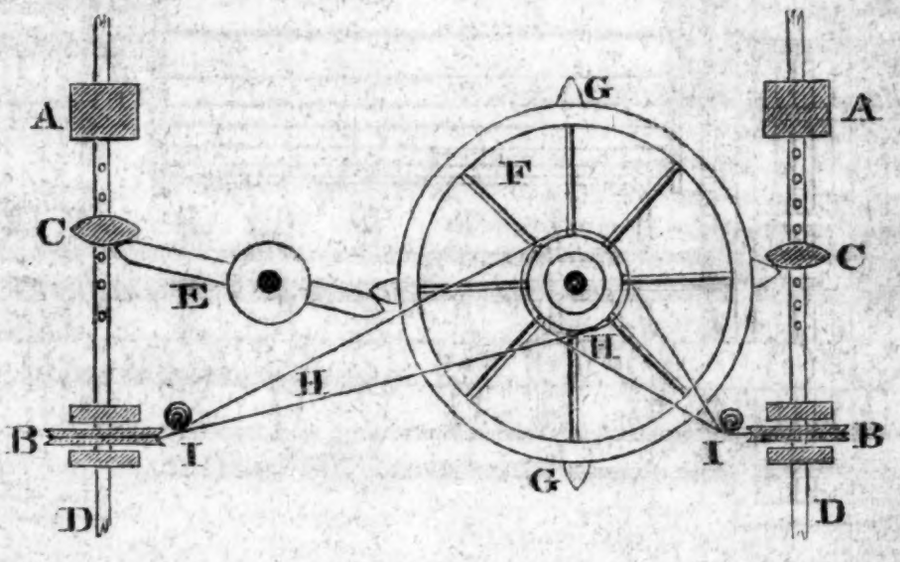
FF, with the similar interrupted circles, represent circular catches attached to the augershanks between D and its inferior correspondent. Theyare to be secured with keys, and may be moved up or downwards at pleasure, so as to be accommodated to the operations of the cogs orcams which are represented by the lines crossing the shafts GG.

HH, two shafts, over which and the pulleys, EE, a series of bands, I, I, pass.

J, an endless chain, receiving motion from a toothed wheel on the water-wheel shaft, C, and communicating it to the shafts GG and HH, in order to sustain the performance of the cams to lift, and the bands to turn the augers, or cause them to rotate.

The following figure (a transverse section) is a modification of the machinery, in which the cams are attached to the water-wheel, and the bands pass directly from the main shaft to pulleys, and then from these pulleys to others.

The timber ties, represented by DD, in the former figure, are shown at AA in this; and BB represent the inferior corresponding pieces, with the pullies, II, in them. CC, the circular catches on the augers. DD, the augers. E, shaft and cam. F, water-wheel. GG, cams of the water-wheels. HH, the bands passing under guide rollers.



Mode of operating. It is evident, if the wheel be put in motion, that all the shafts connected to it by the endless chain will obey the impulse, and rotate with a greater or less velocity, according to the geerings of the individual shafts.

The rotation of the shafts, GG, will cause the cams, which come in contact with the lower surfaces of the catches attached to the augers, to lift the augers to a certain height, and until they can freely pass them, when they will descend and cut the rock beneath.

The bands, which are put in motion by the shafts, HH, give a horizontal rotation to the augers at the time they are rising, or suffered to fall; but when the augers are in contact with

the rocks, they slip on the pulleys, and continue to do so, till the augers are again lifted. When the augers have penetrated the rocks so as to depress the catches too much for the action of the cams, they must be displaced, and longer ones substituted for them, or the catches may be raised. The shanks of the augers on which the pulleys and catches operate, and which pass through the framework should not be disturbed, but the cutting augers should be adapted to them, so as to admit of removal whenever the occasion may require it.

*** For other views and considerations connected with the use of this apparatus, the reader is referred to pp. 130, 131 of this Magazine.

MARINE STEAM ENGINES.

SIR,—Several readers of the Mechanics' Magazine, in this place, are anxious to be informed, by some of your practical Correspondents—

1st.—What ought to be the weight of a wrought iron boiler intended for a marine engine of twenty-horse power?

2ndly.—With what metal are the improved sliding valves and nozzles of marine engines now *faced*, and is there any nicety required in the mode of packing them?

3rdly.—Is a fly-wheel a necessary appendage to a marine engine? if so, what proportion should its diameter bear to that of the paddle-wheel?

I am, Sir, yours, &c.

JUVENIS.

INSTANTANEOUS PRODUCTION OF CURDS AND WHEY FROM MILK.

A very ready and elegant mode of procuring curds, and also a pleasant acidulous whey, is by adding to a glass-ful of milk a little solution of citric acid, taking care not to add too much: an experiment or two will readily show the quanity necessary to effect the purpose.

EXPANSION OF WATER IN FREEZING.

SIR,—It appears from the letter of T H, that I have not eaxctly understood the particular law of the expansion and contraction of water, to which the term *miracle* is applied in the article copied from "*The Chemist.*"—I apologise to the Chemist for my misapprehension, and I thank T H for his correction. I certainly had not read Professor Leslie's Experiments on producing Artificial cold, or I should not have asserted that water freezes slowly in closed vessels. I fell into the error from having read it as a fact some few years ago, in a work at that time of some authority. I am, however, not yet convinced that the *mixture of air with ice* is not partly the cause of its floating upon water; for what results from the experiments of the learned Professor? Why this, that the ice produced by water frozen in as complete a vacuum as can be made, is considerably *heavier* than ice produced in the ordinary operation of nature; and, therefore, I will contend, that this fact is very much in favour of my gratuitous assertion, as T H is pleased to call it. Perhaps, sir, I will be compared to the Schoolmaster, in the beautiful poem of Goldsmith of whom he says—

"For e'en though vanquished, he would argue still"

But I am seeking knowledge, and therefore provoke inquiry, even at the risk of still farther exposing my own ignorance; and I would not have any of my brother Correspondents be afraid of *sporting* a random opinion now and then, for the sake of acquiring information. We cannot all be equally wise; but let us follow the advice of Solomon, who says, "Wisdom is the principal thing, therefore get wisdom"

The beneficial consequences on the economy of nature, in the conversion of water into ice, cannot have escaped the most casual observer; at the same time it must be admitted, that some inconveniences are produced by it. The same cause which pulverizes the clayey, stubborn soil of the farmer, splits and rends his finest oaks; and that frost which mellows our parsnips spoils our potatoes.

I remain, Sir,

Yours, &c.

GELIDUS.

ON THE ECONOMY OF USING OIL LAMPS.

A few years ago the following experiments were made by Dr. Ure (of Edinborough) on the different quantities of light produced by candles of different sizes, and by an Argand lamp.

Dipped candles, ten to the pound, burned four hours thirty-six minutes. As they weighed 672 grains each, of course just 150 grains of tallow were consumed in an hour; and the light given out being measured by the shadow it produced at a certain distance, was estimated by him as a kind of standard, and called 13.

Mould candles, ten to the pound, burned five hours nine minutes. As they weighed 682 grains each, of course 132 grains were consumed in an hour. The light given out was estimated at 12 1-2.

Mould candles, eight to the pound, burned six hours thirty-one minutes. As they weighed 856 grains each, of course 132 grains of tallow were consumed in an hour The light given out was estimated at 10 1-2.

Mould candles, six to the pound, burned seven hours two minutes and a half. As they weighed 11,60 grains each, of course 163 grains of tallow were consumed in an hour. The light given out was estimated at 14 2-3.

Mould candles, four to the pound, burned nine hours thirty-six minutes. As they weighed 17,87 grains each, of course 186 grains of tallow were consumed in an hour. The light given out was estimated at 20 1 4

A pint of good seal oil, weighing 60,10 grains, burned in an Argand lamp eleven hours forty-four minutes. Of course 512 grains of oil were consumed in an hour. The light given out was estimated at 69 4-10.

It follows, from these experiments, that the same quantity of light is procurable from these different number of lights.

2	Lamps,	or	7	moulds	4 to a pound
1	-	-	5	-	6
5	-	-	39	-	8
4	-	-	21	-	10
3		-	16dipped		10

From these experiments, having the price of oil and tallow by the pound, the relative cost of each may be easily found.

The quantities of light were measured in the usual manner; by placing two lights a few inches apart, and at the distance of a few feet from a sheet of white paper stuck upon the wall. On holding a small card near the wall, each light casts a distinct shadow; the brightest light casting a darker shadow than the f inter light. On removing the brighter light farther from the card, or putting the fainter light nearer to the card, the two shadows may be brought to the same shade of colour. The distance of the two lights from the card is then to be measured and squared; the proportion between the squares shows the proportion between the degrees of light given out by each light. Thus, if an Argand lamp, at 10 feet distance from the card, and a candle at 4 feet cast shadows equally deep we shall have the square of ten, that is 100, for the estimated intensity of the light of the lamp; and the square of four, that is 16, for that of the candle; whence the light of the lamp is about six times and a half that of the candle.

Mechanics' Weekly Journal.

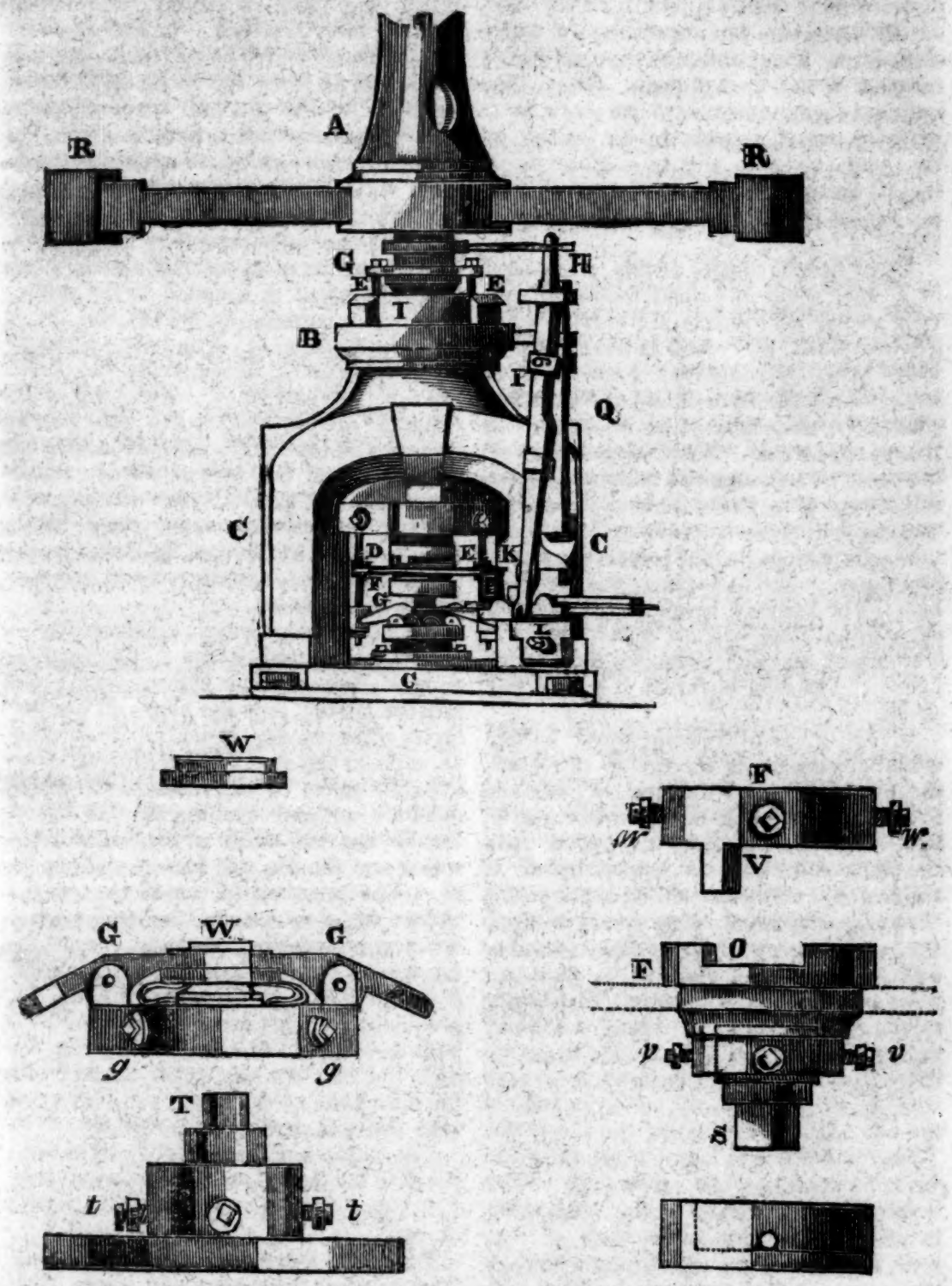
A VALUABLE GREEN COLOUR EXTRACTED FROM COFFEE BERRIES.

At Venice a certain method has been lately discovered for composing a fine unchangeable emerald green colour. A certain quantity of coffee is boiled in river water: spoiled coffee (café avarie) is preferable. By means of a proportionate quantity of pure soda a green precipitate is obtained, which is suffered to dry for six or seven days, upon polished marble, stirring it about occasionally, in order that every part may come in contact with the atmosphere, from which it receives a new vivacity of tint. The green lake obtained by this process has resisted the action of the acids and even the influence of light and moisture.

Register of the Arts and Sciences.

PROCESS OF COINING AT THE ROYAL MINT.

(Continued from No. 14.)



PROCESS OF COINING AT THE ROYAL MINT.

We now proceed to give a description of the Coining Press, an elevation of which is exhibited in the first of the preceding drawings. CCC is a strong cast iron frame, screwed down on a stone basement; the upper part is perforated perpendicularly, to receive the screw, D.—One of the steel dies which strike the coin, is fixed to the lower end of this screw by a box, fig. 4, and the other die is fixed in a box, fig. 7, which is fastened down up-

on the base of the press. The heavy balance weights, RR, are fixed on the top of the screw, which, being turned round, press the upper die down upon the blank piece of coin, which is laid upon the lower die, and gives the impression; a sufficient force being obtained from the momentum of the loaded arms, RR. The motion is communicated to the screw by a piece, A, which ascends to he ceiling of the coining-room, and is worked by a steam engine, with machinery, in the apartment in the room over the coining-room.

Eight presses similar to this, are placed in a row upon the stone basement, and very strong oak pillars are erected upon the basement, and reach to the ceiling.—Each press is contained between four such pillars, and iron braces are fixed horizontally from one pillar to another on the opposite side. These braces support blocks of wood, against which the ends, RR, of the arms strike, to stop them from moving farther than necessary, as, without such precaution, the hard steel dies would sometimes come in contact, and be broken. The piece of blank coin is contained within a steel ring or collar, whilst it is stamped, and this preserves its circular figure. The ring is shown at a large size at W.

V, fig. 2, is a three-pronged spring, which always bears the spring upwards; the opening through the ring, W, is made to fit upon the neck of the lower die, T, fig. 7. When the ring is dropped upon the neck of the die, the upper surface of the ring and of the die will be in one plane. The ring admits of being raised up upon the neck, and will then form a recess or cell, which is just adapted to receive a piece of money. The collar, W, is made to rise and fall upon the neck of the die by means of the levers, GG, fig. 6; these are fitted upon centre-pins or joints, in a large ring, *gg*, which is placed on the outside of the box, fig. 7, containing the lower die, T, and is fixed fast upon it, as shown in fig. 1, by clamping the screws, *gg*. The levers, GG, are forked at the outer ends, to admit studs at the lower ends of iron rods, EE, which rise up through holes in the solid metal of the press, and are united to a collar, G, fitted on the upper part of the screw, D. When the screw of the press is turned back, and the upper die is raised up, the rods raise the outside ends of the short levers, G, and the inside depresses the ring; a blank piece of money is laid upon the die, and when the screw is turned to bring the upper die down upon it, ready to stamp the impression, the levers, G, are released, and the triple spring, V, lifts the collar up, so that it surrounds the piece of money; and in this state the blow is struck. Immediately after, the press returns by its recoil, and then the levers, G, force the collar down upon the neck of the die, and leave the piece free. The lower die is fixed in a box, fig. 7, by the screws, *tt*, which admit of adjusting it with precision beneath the upper die. The box, fig. 7, is screwed down upon the base of the press by four screws. The upper die is shown at S, fig. 3, which explains how it is fastened to the screw; *vv* are four screws, by which the die is held in a box, fig. 3. The box is fitted into a ring or collar, as shown by the dotted lines, F; see also fig. 1. The arms of the collar, F, are attached to the rods, EE, by two nuts at each end; and this makes the collar, F, and the box, 3, always follow the screw, and keep a close contact with the end of the screw, which enters into a cell on the top of the box, fig. 3, but leaves the screw at liberty to turn round independently of the box.

Fig. 2 is a ring, which is fastened by its screws, *ww*, to the screw of the press; a claw, V, descends from the ring, and enters into the cavity, *o*, in the edge of the box, fig. 3, which cavity is nearly three times as wide as the claw, V, and therefore allows the screw to turn round for a certain distance without turning the box, fig. 3; but beyond the limits of this motion the screw and the die will turn round together. The intention of this is to press the upper die down upon the coin with a twisting or screwing motion; but if the die was to rise up with a similar motion, it would abrade and destroy the fine impression; for this reason the notch, *o*, is so wide as to allow the screw to return, and raise the die from immediate contact with the coin, before it shall begin to turn round with the same motion as the screw.

Fig. 4 is a box, which is screwed over the box for the upper die, as shown in fig. 1, in order to keep the upper die firm in its cell.

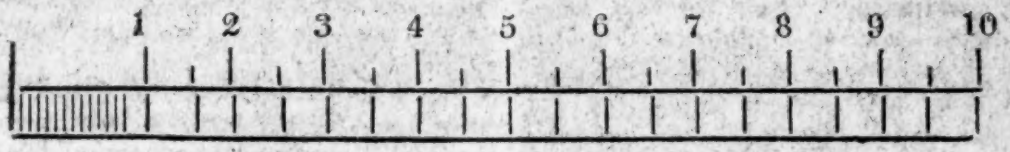
The great screw of the press is made cylindrical at the upper and lower ends, as represented in fig. 1, and their ends are accurately fitted in collars, which are bound tight by screws; the real screw or worm is partly concealed within the solid metal frame, and has no other office than to force the die down, the guidance laterally being effected by the collars.

GUNTER'S SCALE.

SIR,—As the construction and application of Gunter's Scale, particularly that part called the line of numbers, for performing the operations of multiplication, division and extraction of roots, seems to have excited some interest, I shall endeavour to add a little to what has already been said on the subject; for though your Correspondent, "Monad," has given the method of its construction sufficiently clear to those at all acquainted with the nature and application of logarithms, yet he will excuse me, I am sure, in saying that he has omitted that practical illustration of its use that would be of service to the workman; and I was in hopes that he would have followed up the subject by an illustration of their use, particularly when solicited to do so.

The great difficulty in the use of Gunter seems to be in taking from the scale three or more figures; now, in order to thoroughly understand how this is performed, I will first show how, from any plane scale of *equal parts*, decimally divided, we are able to do this.

Let a line, as represented below, divided into ten equal parts, as 1,2,3, 4, &c. and let one part be supposed divided again into ten equal parts (and all the rest similarly divided,) it is plain that each large division will be a unit, or the tenth part of the whole line, and each small division the tenth of a unit; now, if the scale is long enough, each of these *small* divisions may be divided again into ten equal parts, which parts will be the *tenth of the tenth* of a unit, or the hundredth part of a unit.



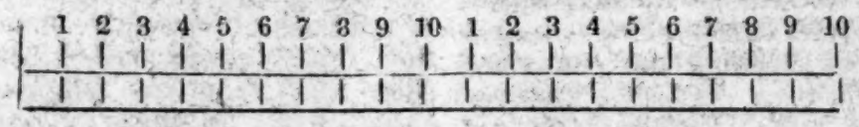
Now, instead of calling the whole line *ten*, we call it a *hundred*, the large divisions will then be *tens*, the small divisions *units*, and the subdivisions (if the scale is long enough to admit it) *tenths of units*; in the same manner, if the whole line is called a *thousand*, the large divisions will be each a *hundred*, the small divisions *tens*, and the subdivisions *units*. It is thus plain that the same scale will answer for either one *unit* with three decimals, one *ten* with two decimals, one *hundred* with one decimal, or one *thousand* without any decimal: thus you may take off from the scale (if long enough) all numbers from ·0001 to 1000.

EXAMPLE.—Suppose it was required to take an extent from the scale, with your compasses, answering to 976.

Here your highest denomination is hundreds; therefore the large divisions stand for *hundreds*, the small ones for *tens*, and the subdivisions *units*. Therefore, setting one leg at the beginning of your scale, open your compasses equal to nine of the large divisions, seven of the small, and eight of the subdivisions, that is, 976, and the same extent will answer to, or express, 97·6, or 9·76, or ·976. It may be here observed, that in the figure drawn above, the small divisions are not drawn throughout the whole length of the scale, as it would cause confusion, and the subdivisions are not marked, as in such a small scale it would have been impossible; but they may be conceived to be drawn and estimated with ease in a scale sufficiently extended.

We will now show how, from this scale of equal parts, we may *add* or *subtract* any number from another, and also find an arithmetical mean between any two numbers; in order to do which, it will be convenient to lay down, on another similar scale, the above line, as in the annexed figure (but too small to show the small divisions or subdivisions,) which is analogous to Gunter's line of numbers, which is two scales

marked from one to ten, but not of equal divisions; whereas this is marked from one to ten, and repeated, being all equal divisions.



Let us illustrate this by an example in each case.

EXAMPLE 1.—Let it be required to add 749 to 856.

Here we have the greatest denomination, *hundreds*; therefore the great divisions are hundreds, the small ones tens, and the subdivisions units; now, find, in the left-hand scale, 8, which is 800, and 5 in the small divisions, which is five-tens, or 50; and between that and the next small division, take six of the subdivisions, which is six units expressing 856. Now this is the point on which to place one leg of the compasses; then, in the same manner, open the compasses to the extent 749, and with that extent, with one leg at the point 856 (as found,) the other leg will reach to 6 in the right-hand scale (which, as we make every large division 100, will be 1000+600, or 1600,) and not quite to the first small division, which is 0: and in the subdivisions, the leg of the compasses will coincide on that which is the fifth subdivision from the 6: thus we have 1000+600+0+5, that is, 1605, the correct answer. And thus we may add any two numbers whose sum shall not exceed 2000; and if a third scale had been added, we might have done the same to 3000, and so on.

EXAMPLE 2.—Let it be required to subtract 749 from 856.

Find the point 856, as in the last Example, and take the distance 749, in your compasses, and you will find, if you extend the other leg towards the beginning of the scale, it will rest between the point 1, which is 100, and not reach the next division, marked the tens, consequently 0 tens, but rest on the subdivision, showing seven units, that is, 100+0+7=107, the answer.

EXAMPLE 3.—Let it be required to find an arithmetical mean (that is, half the sum) between 856 and 749.

Find the sum of the two numbers, as shown in Example 1; then half that distance in the scale, which may be found by trial with the compasses, will be found to be between 8 and 9 in the large divisions, which shows the first figure to be 800, and between the first small division and 0, which shows 0 tens, and between 2 and 3 of the subdivisions, which is two units; but, as it does not exactly agree with that point, we can easily estimate the distance between 2 and 3, where the compasses fall, which is half way, therefore we have the 1-2 of an unit or 1 2 or ·5: thus we have 800+0+2+·5=802 5, the correct answer.

NOTE.—It may be here observed, that as the scales most generally in use are a foot long, the small divisions will be each 100th part of a foot, or a little more than the tenth of an inch, which it will be difficult to divide into ten parts. For the subdivisions this certainly is the case, and for which reason the small divisions are generally divided into two equal parts, and it is left to the operator to judge by the eye, as near as he can, the fifth part of that half, which, by a little practice, may very nearly be estimated; and I would also observe, when the number is large, the unit, in most practical cases, is of no great signification; thus, if the work we have in hand is to be made to the scale of 100 feet to one foot, the thousandth part of a foot, more or less, can, practically, be of little consequence.

(To be continued.)

From The Kaleidoscope.

MECHANICAL PARADOX.

The attraction of gravitation is a power continually acting on matter, tending to draw distant bodies towards each other; the action of this force never ceases, be the matter acted upon large or small; at motion or at rest, this attraction still continues as before. Velocity is a property which matter in motion acquires, and which, when once communicated, would for ever keep the body in the same equable motion, if it were not arrested by some opposing force; this property of matter for acquiring a velocity, operating in conjunction, or at the same time as the constant attraction of gravitation, would cause two bodies, submitted in free space to its action, to be attracted with a motion increasing in proportion to the distance they traversed, *however great*, until they met at a certain point, which, provided they both contained the same quantity of matter, will be that point which was originally equidistant from them both; therefore, supposing these bodies separated to an infinite distance, and then submitted to this action, they will move with a velocity continually accelerating, so as to cause them to acquire an infinite or unlimited velocity.

Let us now investigate the case of a steam engine, in which all obstructions arising from the friction of its parts, the resistance of the air, &c., are completely laid aside; in this case, as in the former, motion is communicated by two forces, acting in conjunction with each other, viz.—

1st. The force of the steam, which is the prime mover, and which, at present, corresponds with gravitation in the former case.

2dly. Velocity, which has been before defined.

Let us now suppose that the steam is urged to the full extent, or, to render the matter more clear, is confined in a generator filled with water, which is constantly kept at one uniform temperature, say a red heat; the first effect arising from the escape of a portion of this water from the generator, in the form of steam, will be to communicate a certain velocity to the wheel or resistance to be overcome, which velocity (obstructions being laid aside, as before stated) would of itself, without farther impulse, for ever keep the wheel in this same equable motion; the next escape of steam adding, as in the case of gravitation, to the already acquired velocity of the wheel, will communicate an accelerated velocity to it, which will be still farther increased by the next escape, and thus it will proceed, the force of the steam increasing the already acquired velocity of the wheel, in the same manner that the force of gravity increases the already acquired velocity of a falling body. But, now comes the question to to be decided—Is this increasing velocity limited, or is it unlimited? Are there bounds to it in this case, or are there none? That it is limited, and, consequently, that there are bounds to it, will, I trust, be rendered evident by the following consideration:—Since the aperture from which the steam issues is always the same size, and the expansibility, or power of the steam to escape, is uniform (the generator being always kept at one temperature) the same quantity will issue from the generator at one moment of time as issued or will issue from it at another; that is to say, the escape, and the consequent power of the steam, is uniform: a uniform and regular power in constant action has a tendency to produce a uniform and regular motion, which would immediately be produced, if no obstacle interfered to oppose its effects; the only uniform motion, in our case of the steam engine, is the force necessary to communicate an equal motion to the wheel, or moving parts of the engine, and which motion, when once acquired, would by the laws of velocity, as before stated, for ever continue, without farther impulse. This velocity being communicated by the force of the steam, the opposition before mentioned is removed, and the escape of the steam becomes consequently regular; the power of the steam cannot any longer increase the velocity of the wheel; for the wheel having, by its velocity, acquired the same power, flies before the steam, in the same manner as a body moving in the same direction, and with the same velocity, as the wind, constantly flies before it, and eludes its pursuit. From this period, therefore, the motion of the engine will be uniform.

The above are my humble ideas on the subject; and are at your service. It appears to me plainly, that a limited power cannot produce an unlimited velocity, and that the power of steam is limited.

W. L——y.

London, Feb. 14, 1825.

WELDING CAST STEEL.

By a communication from Augustus Seibe to the Editor of the London Journal, it appears that the process of welding thin plates of iron and cast

steel together is, in Great Britain, "considered to be a secret, and confined to the few persons who practise it."

Mr. Wm. Pettibone took out a patent some time ago in the United States, for welding these substances together. He used borax for the purpose; but whether it had been previously deprived of its water of crystallization or not, I am unable to say. His mode, however, is generally known and practised by Smiths through the United States.

The use of borax appears to have been discovered and practised by Pettibone upwards of twenty years since.

FORGE HAMMER.

RUTHVEN'S ECCENTRIC WHEEL.

SIR,—In your Magazine I find a description of a new application of mechanical power by Mr. Ruthven. I beg to acquaint you that the same has been in action above two years in my manufactory, where it is employed to give an alternating rectilinear motion to a heavy frame. For this purpose I have two eccentric wheels working in the same nut, and by the *force of their axles* they propel the frame alternately. Mr. Ruthven is not, therefore, the first who has applied this power. I have six pair thus employed.

I am, Sir,
Yours truly,
W. K. SHENSTON

Winchester, Nov. 12, 1824.

HISTORICAL RECOLLECTIONS OF COINING MACHINERY.

Previous to the reign of Charles II. the money in circulation in this country was made by forging or hammering slips of gold and silver to the proper degree of thickness, then cutting a square from the slip, which was afterwards rounded and adjusted to the weight of the money to be made; the blank pieces of money were then placed between two dies, containing the design of the coin, and the upper one was struck with a hammer. This money was necessarily imperfect, from the difficulty of placing the two dies exactly over each other when the blank piece was between them, as well as from the improbability of a man being able to strike a blow with such force as to make all parts of the impression equally perfect.

The mill, or press, was first introduced from France into this country in the reign of Queen Elizabeth but, after a few years use, was abandoned, as too expensive, and the hammer coinage resumed.

The coining press, or mill, is of French origin, and is generally ascribed to Antoine Brucher, an engraver, who, in 1553, first tried it in the French king's (Henry II.) palace, at Paris, for the coining of counters. It continued in use till 1585, in the reign of Henry III. when it was laid aside on account of its being also more expensive than the hammer coinage. The machine remained in disuse until 1623, when Briot, a French artist, who was unable to persuade the French Government to adopt it again, came to England, where it was immediately put in practice under Briot's direction, who was appointed chief engraver of the Mint.

Like many other new inventions it was sometimes used, then laid aside, and the hammer resumed, for about forty years. In the year 1662 the mill and screw were completely established in the English Mint, as it had been by the French in the year 1645. The great improvement which took place in the form and impression of the coin struck by this new invention, gave them a decided superiority over the hammer-money; and the excellent and truly philosophical improvements of the late Mr. Bolton, described in your Magazine, have placed the process of coining upon a basis so firm, and so decidedly superior, both in facility and economy, that we need be in no fear of returning to the ancient and less perfect mode of fabricating our money.

G. H.

LIFTING SHIPS BY STEAM.

SIR,—Having experienced much inconvenience once, from the necessity of unloading a vessel in shoal water, I have long thought whether the desired object might not be obtained by pneumatic means. But since so much information has been diffused respecting the nature and power of steam I conceive, if it were practicable by that power, very essential service might be derived from the application of it to lift ships, so as to lessen their draught for even a small space of time. A valuable ship and cargo might be saved from ruin by the reduction of a foot, or perhaps less, of draught; and many advantages might be taken of navigations that are at present attended with delay, labour, and expense. It might also save much money in the constructing of docks. I shall, therefore, hasten to the subject, or rather to communicate a few hints on the subject; leaving it to the judgment of your numerous readers whether any of them be practicable or otherwise.

The expansive power of steam, when let into a cubical vessel, is eqnal on all sides: to avert the effects of pressure on one side, is the *desideratum*. The question is, could steam be sent into a similar vessel, but open at bottom, and resting in, say a foot of water, so fast and in such quantity as to press the sides and top equally, as if there were no condensing water in the way? If so, the vessel, being fastened to the ship, the latter would be lifted. Would not, then, the continuance of the supply of steam prepare the water, so as to prevent universal condensation; and might not that state of the water be kept up, by the water being changeable, or by a supply from without? Lastly, with a fire-pan underneath a vessel or iron tank of the size of its bottom, so as to admit of the bottom being ignited, and with a funnel through the centre of the bottom to carry off a portion of the steam, but projecting some inches in the vessel to retain the water, might not water be gradually injected through the top or side, for the purpose of being converted into steam; and would not the differenee of pressure on the top and bottom effect considerable buoyancy? This question is to be answered by the perfectibility, or the contrary, of Mr. Perkins's steam rocket.

However erroneous these suggestions may prove, it may nevertheless elicit something new; as we soon discover where the south lies, by having its opposite pointed out. More likely, like Newton's apple, it may fall to the ground fully ripe, and of course destined to decay, although some, to this day, consider that windfall imperishable.

Chatham. T. H. PASLEY.

FRAUDS IN THE COAL TRADE.

SIR,—Your Correspondent R., in his information on the abuses committed in the Sale of Coals, seems to intimate, that the fraudulent dealer would not be induced to mix water with coals, if he were compelled to sell coals by weight; because, he says a bushel of wetted coals weighs lighter than a bushel of dry coals, inasmuch as the dust of the dry coals insinuates itself into the interstices between the larger pieces of coal, and makes the mass almost as ponderous as if it were solid; whereas the barticles of small coal, when wetted, do not easily pass into the vacant places and a bushel of wetted coal weighs less than a bushel of dry coal. But R. does not recollect, that if to one hundred weight of coals, one quarter of a hundred of water be added, and mixed, the entire mass will certainly weigh a hundred weight and a quarter; and, at the same time, it will be practically found, that the volume of the mass is greatly increased; and that, although one measure of the mixture would weigh lighter than a measure of dry coal, yet that there are so many more measures of the mixture to be sold than there were of the dry coal that, by selling the whole weight the dealer would be much a gainer by the fraud.

I am, Sir,
Your sincere wellwisher,
A SURREY FARMER.
November 4, 1824.

LIME-BURNING.

SIR, Any of your Correspondents would much oblige me, who would inform me, through the medium of your Magazine, what are the most eligible form, dimensions, and construction, for a small Lime-Kiln, intended for the burning of lime, for the purposes of manure, from chalk, with furze or whins (*ulex Europæus;*) and whether the same shape

of kiln will equally admit the burning of lime with coal or with turf; by which name I mean not pure peat, but the heathy sward pared from a black, moory, or peaty siliceous soil, with its growth of heath, grass, and some petty whins; and what ought to be the expense of constructing such a kiln. The materials which can be most conveniently procured in the neighbourhood, are brick-clay, rather overcharged with argil hard chalk, limestone, and lime; stone grit, or siliceous limestone, which is often used as firestone. Any information on the choice, mixture, or position of the materials for the building; on the choice, or mixture, and comparative utility and strength, of the fuel; and on the choice of the harder or the softer chalk, for the purpose of lime for manure (as I have both;) and on the size to which the chalk should be reduced before it is put into the kiln; and also references to any approved works on the subject,—will be thankfully received.

S. F.

LAMP FOR BURNING CONCRETE OILS, TALLOW, BEES'-WAX, &c.

As early as 1812, we made some experiments, with a view to obtain a self maintaing alcholic blow-pipe, in the course of which, the idea of using the heat, generated by combustion in the common lamp, so as to render concrete, fatty substances as fluent as our best oils, and as applicable to illuminating purposes occurred to us. To ascertain the practicability of the suggestion, a lamp, of the form of the annexed engraving, was charged first with lard, then with tallow, and afterwards with bees'-wax; and when so respectively charged, it was lit, and as anticipated, the heat was every way sufficient to maintain the fusion necessary for their substitution for oil

In one instance, in fact, the temperature was raised so high as to fuse the soldering of the lamp; and it could be considerably increased by approximating the wire still nearer to the flame.

A cup lamp, furnished with two wicks and two conductors, and charged daily with tallow, was used in front of the United States' Mint, in Philadelphia, for several weeks, during the coldest winter weather; the tallow always continued liquid as long as the wicks burned, and notwithstanding these wicks were of the same size as those of the other street lamps, their illuminating power was very perceptibly greater.

These lamps, modified in their forms, were introduced to light up a few manufacturing establishments during the late war, but since the reduction in the price of oil, we believe, their use has been abandoned. Through change of times they may again claim attention; and, perhaps, at all times, the farmer would find his account in using them instead of candles; for it should be recollected, that all the offal fats of the kitchen, purified by boiling on water, will answer as well as the cleaner sorts for producing light. They may also be found useful for burning the common kinds of oil in cold weather.

The only offset to the use of these lamps, that now occurs to me, is the necessity of the tallow, &c. being flu-

id when they are lighted. This applies particularly to the close lamp: the cup lamp inflames very well when the tallow is chilled or frozen, provided it has been previously filled; but if we compare the cleanliness and safety of lamps over candles, especially for moveable lights, this objection, in families who conduct their concerns systematically, will scarcely be perceived.

These conductors have also been adapted to lamps furnished with glass chimneys.

Description of the Engraving.

A represents the reservior of the lamp.
B the charging aperture.
C the heat conducting rods.
D guide for the rods C.
E thumb-screw, to adjust the cap of the conductors at any required height above the flame.
F a single conductor, which may be substituted for C, and be permanently soldered to the lamp.

N. B. A lamp containing three or four ounces of tallow, would require a conductor of iron or copper, one seventh or one eighth of an inch in diameter, and the bent portion should be placed about one and three quarter inches above the wick tube.—Ed.

IMPROVED CHUCKS FOR LATHES.

Edward Speer, of London, has presented to the Societyof Arts a simple mode of constructing chucks, which will be found of advantage to the practical turner

His chuck consists of a succession of hollow truncated cones, fitting into each other, the outer one screwing on to the mandril of the lathe, like a common chuck. These hollow cones adhere together by the closeness of their fitting and the recess of the inner cone holds the end of the article to be turned, which is made fast in it by screwing up the pivot at the opposite end. This kind of chuck is calculated to obviate the necessity of numerous chucks of different sizes, as it is only necessary to remove so many of the cones as will leave a hollow sufficient to receive the end of the article. The trouble attendant on the fitting a piece of wood to the lathe, by this contrivance is entirely obviated.

The chuck is as well calculated for turning brass or iron, as wood and other soft substances; and it possesses an advantage which is peculiar to itself, for it is nearly impossible to injure the turning tool, should it come in contact with a knot; for the friction of the chuck would, by such obstruction, be overcome, and the cones slide round one within the other; that is, if the force was not too great by which they were pressed together, and this can always be diminished or increased at pleasure, by moving the screw in the back poppet of the lathe.

The cones of the chucks are to be turned at an angle of ten or twelve degrees to the axis. Cones made of iron and of brass have been tried, but they are more expensive, and do not answer as well as wood, owing to their smoothness; this however, may be remedied by roughing them; but under all circumstances wood is to be preferred, as they can be made at trifling expense, and possess sufficient strength; indeed, more than can possibly be required in such lathes.

Journal of Arts and Sciences.

REPORT

Of the Committee appointed by the Managers of the Franklin Institute, Philadelphia, to investigate the merits and advantages to be derived from the use of Joshua Shaw's improved mode of exploding heavy ordnance and cannon generally.

Experience has shown that something like the present has been long a desideratum with military men, and numerous attempts have been made to obtain it; a minute history of which is unnecessary here. During the late war, the United States' government caused many experiments to be made in various ways, and considerable improvements were introduced into the science; notwithstanding, there has been ample scope left for Ingenuity to exercise herself. Her store of knowledge has never yet been exhausted, but seems to increase in proportion to her practice and her experience, and will probably continue so to do, as long as the

civilization of man and good government shall remain among us.

This improvement is simple, both in respect to the primer itself, and the part with which it is connected; dispensing with the match or portlight, the piercing of the cartridge, occupying the touch-hole with powder, priming tubes, &c.; and the lock, if it can be called one, is constituted of but two members, simple in their form, certain in effect, and entirely without friction. With respect to the primer itself, we are requested by Mr. Shaw to refrain from any particular description of it until he should have secured it by patent, or the Board at Washington may come to some resolution respecting it.

In appearance it resembles a small piece of metal, about the size, and very little thicker than a five cent piece, which is placed over the touch-hole of the gun, and exploded by the falling of a strong spring, which is set at liberty by the shifting of a prop or button, both of which are attached to the cannon.

The advantages of this primer, and the mode of applying it, place it at an immense distance in advance of every improvement hitherto made in this department of science; and having examined it in every point of view we are of opinion, and from the simplicity of the whole together, it would appear impossible that it should fail to answer the purpose for which it is intended, or even liable to get out of order; and we strongly recommend it to the serious attention of the nation, on the following considerations:—

First, that it is cheaper:—Secondly that it is more certain in its effects:—Thirdly, it is calculated to prevent many accidents to which ships are liable in action; Fourthly, one hundred thousand only occupy one square foot of stowage, and are less liable to injury by transportation than many of the means hitherto employed;—Fifthly, the gun may be fired with facility in rainy weather, without much risk of disappointment, and also the manual labour at the gun is much reduced.

D. H. Mason
Isaiah Lukens
John S. Phillips.

July 1, 1824.

BROWN'S ENGINE.

SIR,—In answer to your Correspondent A. F. S. of the commercial-road, I beg to inform him that there has not been one of Mr. Brown's Gas Engines tried upon the piston principle yet; but there will be in the course of thirteen or fourteen days, as Mr. George Frasi, the engineer, who is manufacturing one, informs me.

I am, Sir, &c.
A BURNT RETORT.

P. S. I think Messrs. Martineau and Taylor's gas apparatus would be of great service to Mr. Brown's engine, for making gas in a small compass.

Sir,—Your Correspondent "D. Screw" may be so far in the right as regards my remark on Brown's Gas Engine, but he has not shown that Messrs. Sterling and Brown's machines are different in principle—*This he certainly ought to have done before he had stated that I was erroneous.* Erroneous in what? If he will take the trouble to compare my statement with his, he will perceive that I have not been in an error.

The principle upon which this engine acts (Mr. Sterling's) "is by the alternate expansion and condensation of the *same air.*" But D. Screw will observe that no mechanical art is used for this condensation; it is merely the heated air rushing into a colder apartment, and, by this means, collapsing itself.

Now the mechanism of Mr. Sterling's engine would be rendered equally effective without such a cylinder, simply by substituting a valve or valves to admit the external air. Where then, I would ask, exists the difference between Sterling and Brown's machines? You admit "that the mechanical parts of these engines may be continually varied; *but the construction by which the vacuum is effected, and for which the pa ent is obtained,* MUST ALWAYS FORM THE MOVING POWER;" and pray, what is that? Why, the rarefaction of air by heat. Your Correspondent, therefore, need not attempt to *screw* into my cranium any principles repugnant to those which I have already placed there; and although

I am no dogmatist, yet I think it will require all his power to *wrench* them from me.

I am, Sir,
Yours, &c.
J. Y.

STEAM NAVIGATION.

Sir.—The interest excited by the Steam Boat question has tempted me to offer another solution; and if those whose mathematical knowledge may enable them to reason without doubt on the subject do not think it correct, perhaps they will kindly show the light of their information to one who is earnestly endeavouring to find his way in the dark.

Suppose the velocity of the wind required to propel the boat six miles per hour be twenty miles per hour, then 20—6= 14= the relative velocity, or that with which the wind acts on the sails of the craft that already moves six knots per hour by the steam. The *force* of the steam or of the wind acting separately is similar, because the effect is the same, viz.—that of moving the vessel six knots (per question;) but the force with which the wind acts for any given time is as its velocity in the same time squared; in this case, if the wind act alone, it is therefore as $\overline{20^2}$; also the force of the steam, as before mentioned, being similar, that force to move the vessel six miles per hour is likewise as $\overline{20^2}$, and the force with which the wind acts on the boat already in motion by the steam is as the velocity squared, that is, as $\overline{14^2}$.

Hence $\overline{20^2} : 6 :: 14^2 : x$ (2.94.)

In words—If a force proportional to $\overline{20}$ move the boat six knots per hour, at what rate would a force proportional to $\overline{14^2}$ move her? The fourth term or answer, however, is too much, and requires a correction, because the wind will not act with so great force when it has impelled the boat (by its first impulse) faster than six knots. It is likewise evident the succeeding impulses will be weaker as it recedes from the preceding ones; therefore I take, as an approximation not far from the truth, the square root of the fourth term for the additional velocity communicated to the boat by the wind. The answer will then be $6 + \sqrt{2.94} = 6 + 1.716$, or 7.716 less than seven miles and three quarters per hour.

It will be seen that I have taken the velocity of the wind at twenty; a few miles either way will make but little difference, which may be readily seen by any one who chooses to try 25 or 30 with the analogy.

I am, Sir,
Your humble servant,
PADDLEWHEEL WIND-AND-STEAM.

WATCH KEYS.

SIR,—It will afford satisfaction to myself and others if any of your ingenious Correspondents can suggest a good reason for the alteration that was introduced about twenty-five or thirty years ago in the construction of Watch Keys. So complete, indeed, has the change been, that it is now nearly impossible to find, in any shop, a key on the old mechanical principle, which yet, in my humble opinion, was admirably adapted to its purpose, and much superior, both in convenience and equability of winding, to the modern or straight key, in the employment of which the motion is necessarily intermitted and *jerking*. If it be attributed merely to the caprice of fashion, I should say, that however allowable it may be to sacrifice to that idol in things indifferent, in those of pure utility we should endeavour, in the first place, to ascertain the best inventions, and then adhere to them until they shall be superseded by obvious improvements.

I am, Sir, the well-wisher of your instructive publication,

SENEX.

TO PREPARE LEMONADE.

Mix one part of citric acid with six parts of finely powdered sugar: a very fine dry lemonade is thus prepared, which may be preserved for any length of time. The quantity of this mixture necessary to be put into a glass of water, to make a pleasant drink, must be regulated by the taste of the person using it.

READ'S VITRIFIED PIPES. *

SIR,—My attention has this day been arrested by a letter in your Magazine, from a "Lover of Useful Inventions," who, in allusion to Mr. John Read's Patent Vitrified Pipes (baked pipes, as he is pleased to call them,) for raising water, asserts that they *by no means answer the intended purpose.* That such an assertion should be made in the face of a great number of facts to the contrary, and at a time when every expectation of the utility of these pipes is fully realized, and the merits of the invention substantiated, by an extensive application of them for drawing water from wells in various parts of the country, is somewhat extraordinary, and discovers a feeling not very creditable to a promoter of inventions and the arts. Having some knowledge of the utility of Mr. Read's pipes, and knowing that he is himself at this time engaged in some parts of Sussex in laying them down, I feel myself called upon to vindicate their merits as far as in my power. As an antidote to the gross misrepresentations in the letter I allude to, I shall briefly state one or two facts that are within my own knowledge, and of which any other person may satisfy himself. Mr. Perigo, sen of Hawkhurst, Kent, had a pump constructed of the patent earthen pipes, in 1816, which has continued in perfect condition and action ever since, with the exception of a very slight repair after the severe frost in the year 1822. In this instance the pipes were laid at the depth of fifty feet. Mr William Noakes, of Ticehurst, Sussex, had a lead pump taken up from a well on his premises, fifty feet deep, and replaced it with the patent earthen pipes for less than one-third of the expense of the lead-pump. This was done in 1819 or 1820, and the pump had continued to act well ever since. The truth of this may be known by applying to Mr. Moakes, hop-factor, in the Borough, Southwark.

It is true that some defects were discovered in the early stages of Mr. Read's experiments (and what invention, which requires perfection in every part, has not been attended by some crosses or other?) but even these may have arisen more from collateral circumstances than from the intrinsic qualities of the pipes themselves—such as in stiff clay soils, from injury being done to the pipes by the contraction of the earth, and, in some instances, by severe frost, which will, at times, even burst leaden pipes; but even such difficulties as they have, by practice and experience, been entirely obviated.

I am, Sir
Your humble servant,
R. STANYNOUGHT.

Newington, Surrey,
Nov. 24. 1824.

* I have been informed that Jesse Kersey of Pennsylvania, has had an establishment for manufacturing these kinds of pipes in operation these ten or fifteen years. They answer a valuable purpose.—ED.

AMERICAN PHILOSOPHICAL APPARATUS.

SIR,—We have seen some philosophical apparatus, such as air pumps, electrical machines, &c which, for accuracy, beauty, and excellence of finish, are not surpassed by any of the Europern importations.

They were manufactured by Messrs. W. & A. Mason, of Philadelphia, who, we understand intend carrying on this branch of business, provided they receive suitable encouragement. Their claims to patronage are of the first order; it is reasonable they should look for it; it is necessary for the continuance of their establishment; and we sincerely hope, for the credit of our country, that it will be extended to them to the satisfaction of all our wants in their practical line. If they work equally well, it is certainly better to send our orders to Philadelphia, than to Europe; for, besides the economy of the measure, we can have them much more speedily executed.

MACHINIST.